

## MARK SCHEME for the October/November 2007 question paper

|                |                                                         |
|----------------|---------------------------------------------------------|
| <b>4024/01</b> | <b>4024 MATHEMATICS</b><br>Paper 1, maximum raw mark 80 |
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This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began.

All Examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes must be read in conjunction with the question papers and the report on the examination.

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|    |     |                                                                      |          |                                                                                                           |
|----|-----|----------------------------------------------------------------------|----------|-----------------------------------------------------------------------------------------------------------|
| 1  | (a) | $\frac{9}{40}$ cao                                                   | 1        | e.g. $\frac{9}{500}$ , $1.8 \times 10^{-2}$                                                               |
|    | (b) | 0.018 or equiv.                                                      | 1        |                                                                                                           |
| 2  | (a) | $\frac{8}{9}$ cao                                                    | 1        |                                                                                                           |
|    | (b) | $\frac{1}{6}$ cao                                                    | 1        |                                                                                                           |
| 3  | (a) | 4.32(0)                                                              | 1        | not 4320. Accept $4\frac{32}{100}$ or equiv.                                                              |
|    | (b) | $(-1)^3, 3^{-1}, 3^0, 3^1$                                           | 1        | Accept corresponding correct values                                                                       |
| 4  | (a) | $56^\circ$                                                           | 1        |                                                                                                           |
|    | (b) | 2 cm                                                                 | 1        |                                                                                                           |
| 5  | (a) | 375                                                                  | 1        |                                                                                                           |
|    | (b) | 27                                                                   | 1        |                                                                                                           |
| 6  | (a) | 6                                                                    | 1        | Accept any correct equiv.                                                                                 |
|    | (b) | $3 - 2x$                                                             | 1        |                                                                                                           |
| 7  |     | rectangle from 4-5 height 20                                         | 1        |                                                                                                           |
|    |     | rectangle from 5-8 height 5                                          | 1        |                                                                                                           |
| 8  | (a) | $y > 1$ , $y < 2x$ or equiv.                                         | 1+1      | or sc1 for using the two correct equations but with the wrong inequalities                                |
|    | (b) | 3                                                                    | 1        |                                                                                                           |
| 9  | (a) | $B \cap C \cap A'$                                                   | 1        |                                                                                                           |
|    | (b) | (i) 31<br>(ii) 9 or f.t. 40 – their (b)(i)                           | 1<br>1 ✓ |                                                                                                           |
| 10 | (a) | $\begin{pmatrix} 8 & -3 \\ 9 & -4 \end{pmatrix}$                     | 1        | Allow $\frac{1}{3} \begin{pmatrix} 0 & 1 \\ -3 & 4 \end{pmatrix}$<br>Accept decimals to 2 d.p. or better. |
|    | (b) | $\begin{pmatrix} 3 & 0 \\ 0 & 3 \end{pmatrix}$                       | 1        |                                                                                                           |
|    | (c) | $\begin{pmatrix} 0 & \frac{1}{3} \\ -1 & 1\frac{1}{3} \end{pmatrix}$ | 1        |                                                                                                           |
| 11 | (a) | 5.35 5.45<br>82.5 87.5                                               | 2        | or B1 for 2 or 3 correct                                                                                  |
|    | (b) | 189.5 g or f.t. from their lower bounds                              | 1 ✓      |                                                                                                           |
| 12 | (a) | 120 newtons                                                          | 1        | or B1 for “k” = 24                                                                                        |
|    | (b) | 8                                                                    | 2 *      |                                                                                                           |



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|     |                     |                                                                          |                                         |                                                                  |                                                                                                            |                                     |
|-----|---------------------|--------------------------------------------------------------------------|-----------------------------------------|------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|-------------------------------------|
| 21  | (a)                 | $h = \frac{1}{4}$ or 0.25                                                |                                         | 1                                                                |                                                                                                            |                                     |
|     | (b)                 | (i)                                                                      | $\frac{3}{10}$ or 0.3                   |                                                                  | 1                                                                                                          |                                     |
|     |                     | (ii)                                                                     | 0 cao                                   |                                                                  | 1                                                                                                          |                                     |
|     |                     | (iii)                                                                    | $\frac{1}{10}$ or 0.1                   |                                                                  | 1                                                                                                          |                                     |
| 22  | (a)                 | clear $30 + (300 - \frac{1}{2} \times 30 \times "12") \div "12"$<br>40 s | M1<br>A1                                | 2 *                                                              | or sc1 for a final answer of 10<br>or B1 for 180 or 120 seen                                               |                                     |
|     | (b)                 | tangent drawn at $t = 55$<br><br>0.12 to 0.24 ( + or - )                 | T1<br><br>B1                            | 2 *                                                              | no "daylight", nor freehand<br><br>dep. on using an acceptable tangent                                     |                                     |
| 23  | (a)                 | 20°C                                                                     |                                         | 1                                                                |                                                                                                            |                                     |
|     | (b)                 | (i)                                                                      | 4°C                                     |                                                                  | 1                                                                                                          |                                     |
|     |                     | (ii)                                                                     | 2400 m                                  |                                                                  | 1                                                                                                          |                                     |
|     | (iii)               | $16 - \frac{x}{150}$                                                     |                                         | 2                                                                | or sc1 for $\frac{\text{their (a)}}{3000} \times x$                                                        |                                     |
| 24  | (a)                 | (4) 8, 16, 12                                                            |                                         | 1                                                                |                                                                                                            |                                     |
|     | (b)                 | $x = 2n$                                                                 |                                         | 1                                                                |                                                                                                            |                                     |
|     |                     | $y = n^2$                                                                |                                         | 1                                                                |                                                                                                            |                                     |
|     |                     | $z = n^2 - n$ or equiv                                                   |                                         | 2                                                                | or sc1 for a correct expression in terms of $x$ and/or $y$ (and possibly also including the variable $n$ ) |                                     |
| 25  | (a)                 | 293° to 295°                                                             |                                         | 1                                                                |                                                                                                            |                                     |
|     | (b)                 | completed $\triangle ACD$ with two arcs at $D$                           |                                         | 1                                                                | within 2 mm of correct pt                                                                                  |                                     |
|     | (c)                 | (i)                                                                      | perp. bisector of $AC$                  |                                                                  | 1                                                                                                          | within 2 mm, 2°                     |
|     |                     | (ii)                                                                     | line parallel to $AB$ , 5 cm above $AB$ |                                                                  | 1                                                                                                          | within 2 mm<br>Accept dashed lines. |
| (d) | $CP = 6.3$ to $6.7$ |                                                                          | 1                                       | dep. on the correct loci and the label $P$ at their intersection |                                                                                                            |                                     |